

50X1-HUM

UNEDITED ROUGH DRAFT TRANSLATION

FGS 350-TYPE SHIP RADAR INSTALLATION

BY: Author Unknown

English Pages: 16

SOURCE: Schiffs-Radaranlage FGS-350, VEB Funkwerk,
Berlin, pp. 1 - 15

50X1-HUM

FGS 350-type Ship Radar Installation.

Application of Set

*series- produced by VEB FWH in 1961.
Koepernick Radio Plant*

The FGS 350 ~~type~~ ship radar installation is intended for use as auxiliary navigational equipment on ~~seagoing~~ vessels, especially on small ships or on large ships as a second, independent installation ^{inasmuch} as the set is extremely small and easily ~~constructed~~ ^{designed}.

The set satisfies requirements in coastal waters, narrow navigational channels, heavily travelled ship routes and ^{for} traveling in bad weather and ice. A map-like picture of the surroundings of the ship is created on the projection screen, ^{from which the} ~~wherefrom~~ direction and distance of objects are determined. The ship's position is identical with the center point of the screen.

Special Characteristics.

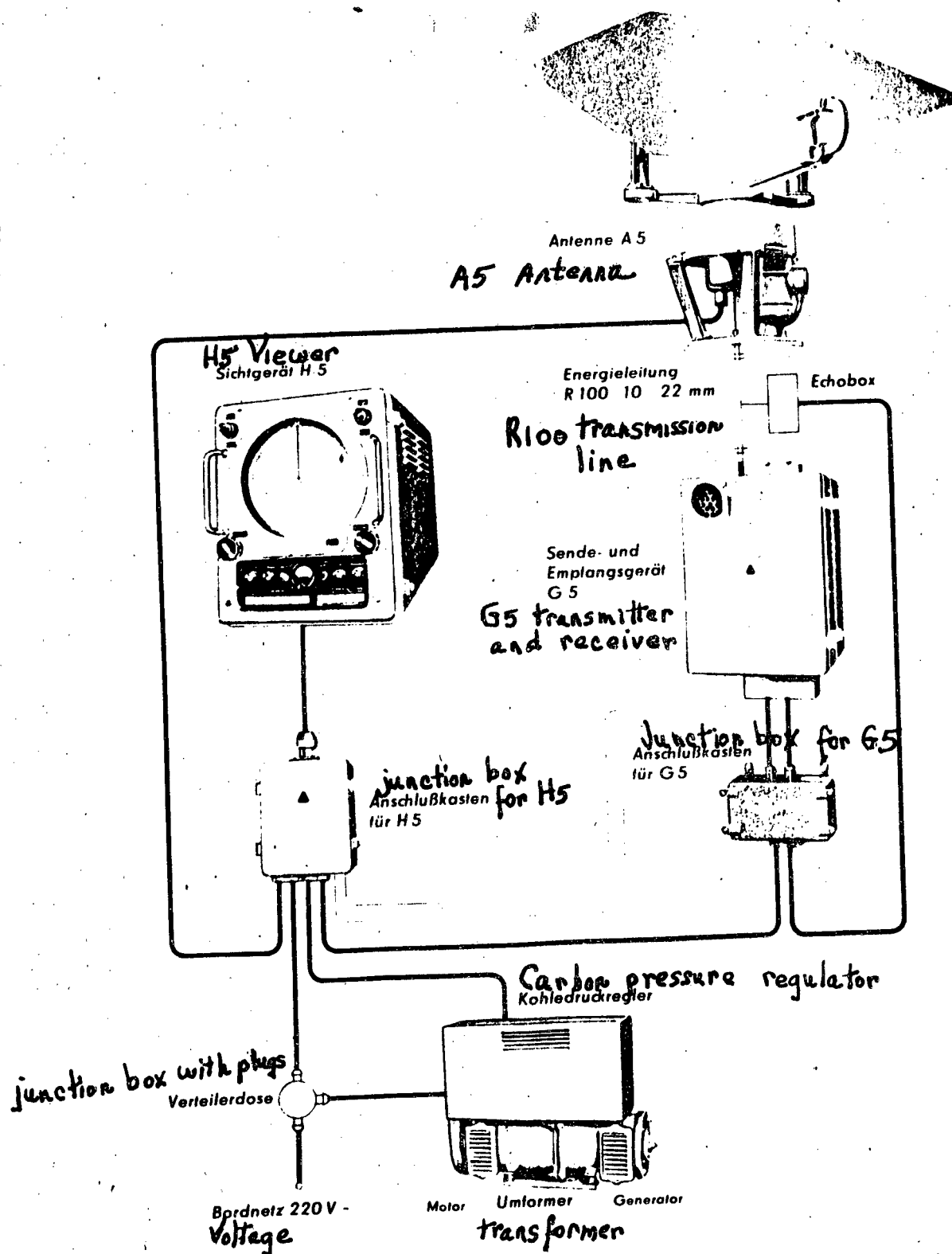
- * The FGS 350 ~~type~~ set is characterized by its ^{smallness} compactness and small weight.
- * Upon request, the set can be delivered with a support column for the viewer.
- * ^{The} viewer can be swiveled in the fork of the support column.
- * Klystron modulation ^{is} possible on the viewer.
- * Partial ^{use} utilization of sub-miniature tubes.
- * low power consumption, approx. ^{imately} 600 watts.
- * picture expansion possible in every range for map comparison purposes.

Brief Functional Description.

High-frequency electromagnetic waves are generated by a generator and transmitted by a pulse modulated transmitter ^{through} ~~via~~ a rotating directional beam antenna. Upon reaching objects with sufficient reflection characteristics, the emitted waves are reflected and return to the antenna, which serves as transmission and receiving antenna. From ~~there~~ the signals are transmitted to a receiver, intensified and made visible on the projection screen of a cathode-ray tube.

50X1-HUM

View of equipment for use on 220V



50X1-HUM

Technical SpecificationsA5 Directional Beam Antenna.

Rotation 20 rpm

Directive-antenna effect: horizontal *2 degrees* half width
vertical *20 degrees* half width

Minor lobe loss *> 30 db* ~~decibels~~

Drive: DC flange motor 220 v ~~220~~ *145* 140 watts

G5 Transmitter and Receiver.

Transmitter.

Frequency 9375 *Mc* ~~Mc~~ (3.2 *cm*) ~~cm~~ *centimeters*

Modulation pulse modulation

Pulse-recurrence frequency 1600 cps

Pulse duration 0.13 microseconds (up to 1.5 *μs*) and 0.5 microseconds (from 3 *μs*)

Pulse performance 7 ~~kw~~ *to* 21 ~~kw~~ kilowatts

Transmission tubes magnetron, 2 J 42

Receiver.

Sensitivity 25 KT₀

Oscillation tubes reflex klystron, *7B* A/B

Mixed crystal 0A 513

Intermediate frequency 35 ~~Mc~~ *Mc* megacycles

Modulation stage,

High-voltage 6 ~~kv~~ kilovolts

Intermediate frequency amplifier:

Band width 10 ~~Mc~~ *Mc* megacycles

Power Cable (antenna cable)

Pipe diameter nominal size, 10 ~~by~~ 22 ~~mm~~ *mm* millimeters

Connections throttle flange

Gaskets rubber rings and perfor 0.2 ~~mm~~ *mm* millimeters

H5 Viewer

Screen diameter 9" inches

Measurement ranges 0.75; 1.5; 3; 6; 12 sm; each range can be doubly expanded (continuous).

Image orientation ship ahead

zero point expansion

forward indicator

range-finder

seaway interference eliminator (sharpening of minimum)

sharpening of minimum (rain)

manual operation of reflector voltage

Close scattering 25 meters

Power Supply

Single casing transformer

primary 220 volts, approximately 0.6 ~~kw~~ ^{kilowatts}

secondary 115 volts, 400 cps, 0.35 ~~kw~~ ^{kilovolt-amperefs}

Starter and regulator are parts of the transformer,

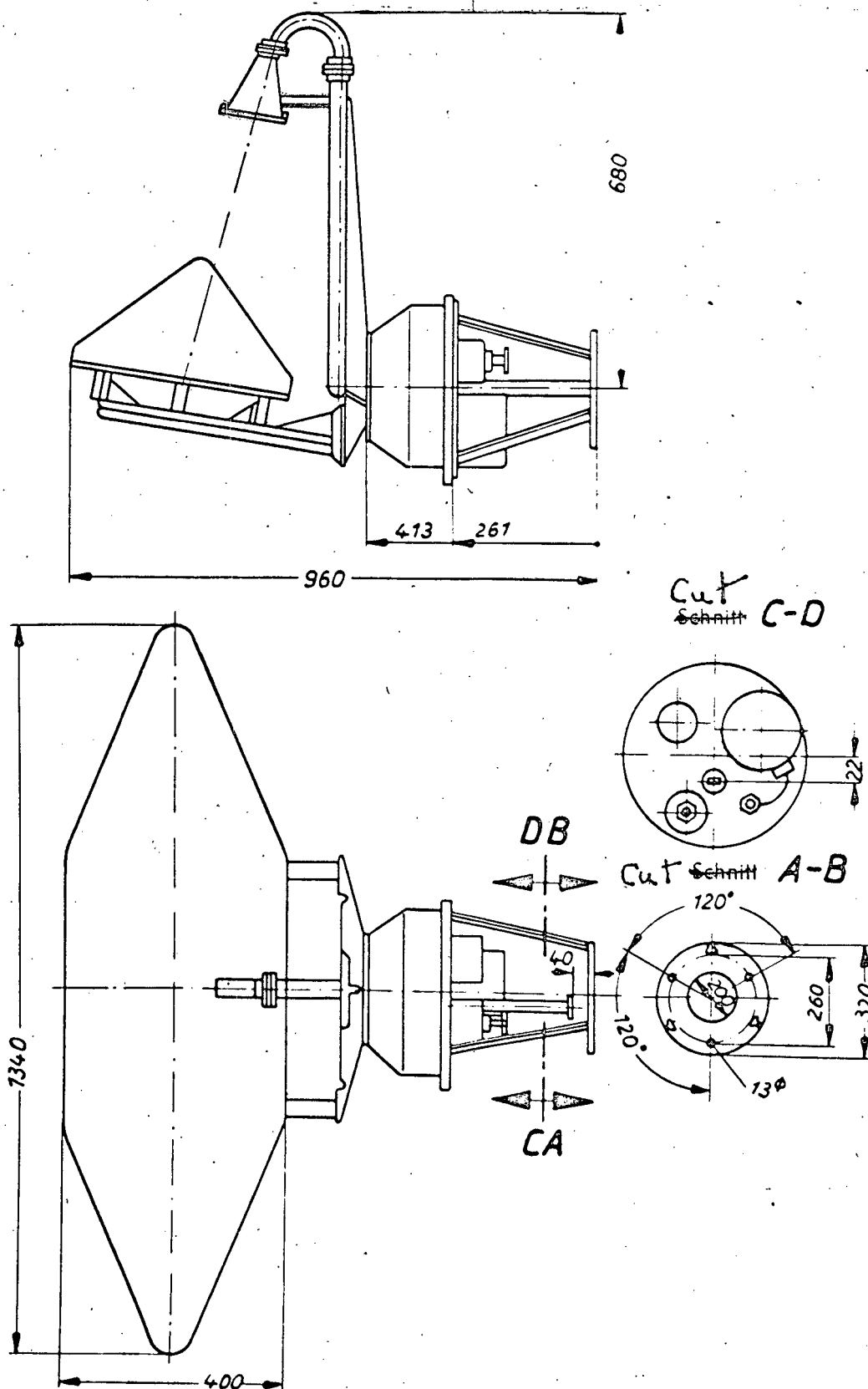
Parts of the installation,

The complete FGS 350 ~~type~~ ship radar installation is made up of the following components:

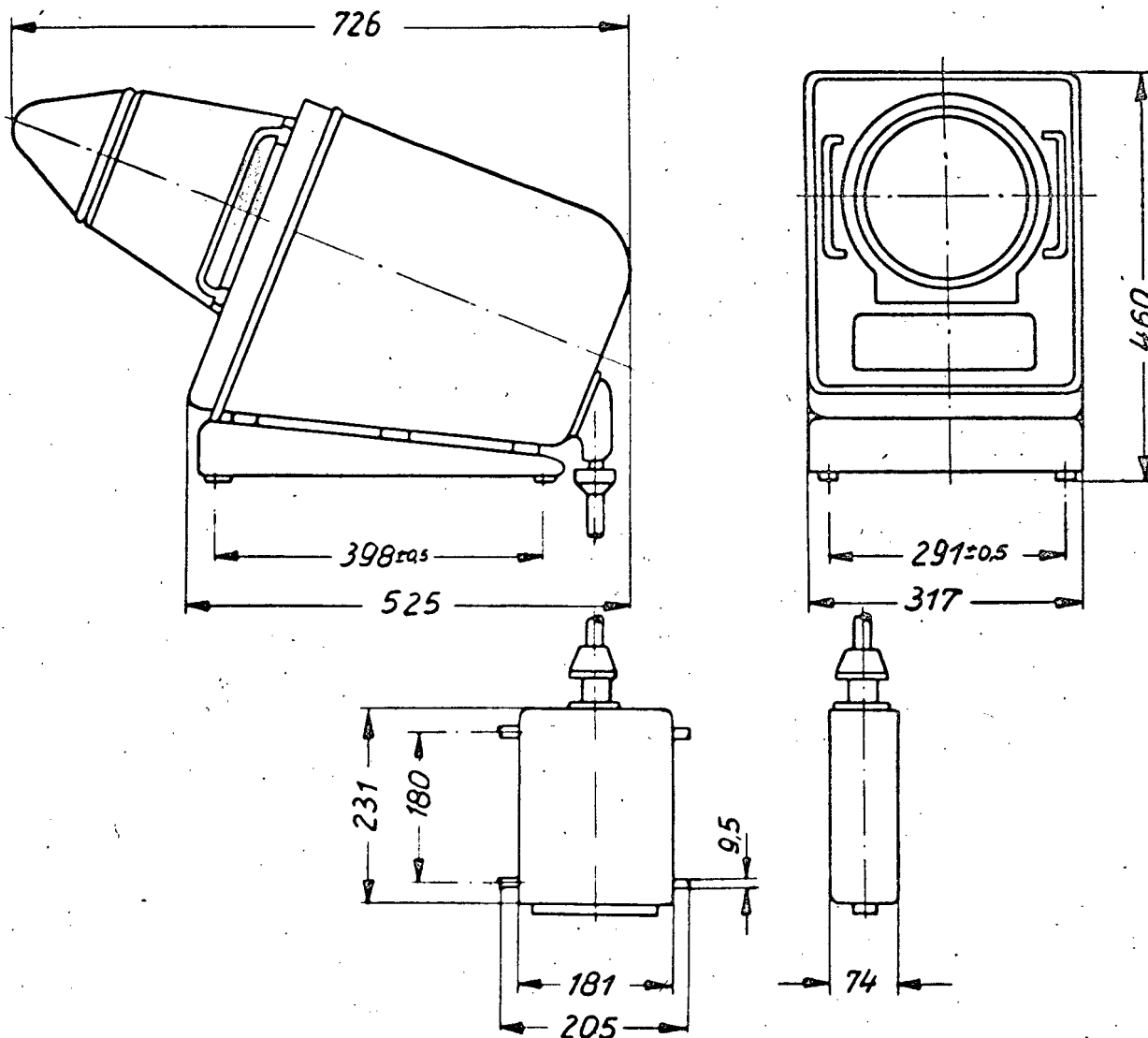
1. A5 ~~type~~ directional beam antenna,
2. G5 ~~type~~ transmitter and receiver with power pack,
3. junction box for G5,
4. H5 ~~type~~ viewer with power pack,
5. junction box for H5,
6. power supply,

A5 Directional beam antenna diagram

A5 Antenna

Weight ^{about} ~~approx~~ 31 ^{kilograms} ~~kg~~

H 5 Viewer diagram
 Weight approx 25 kg kilograms
 about

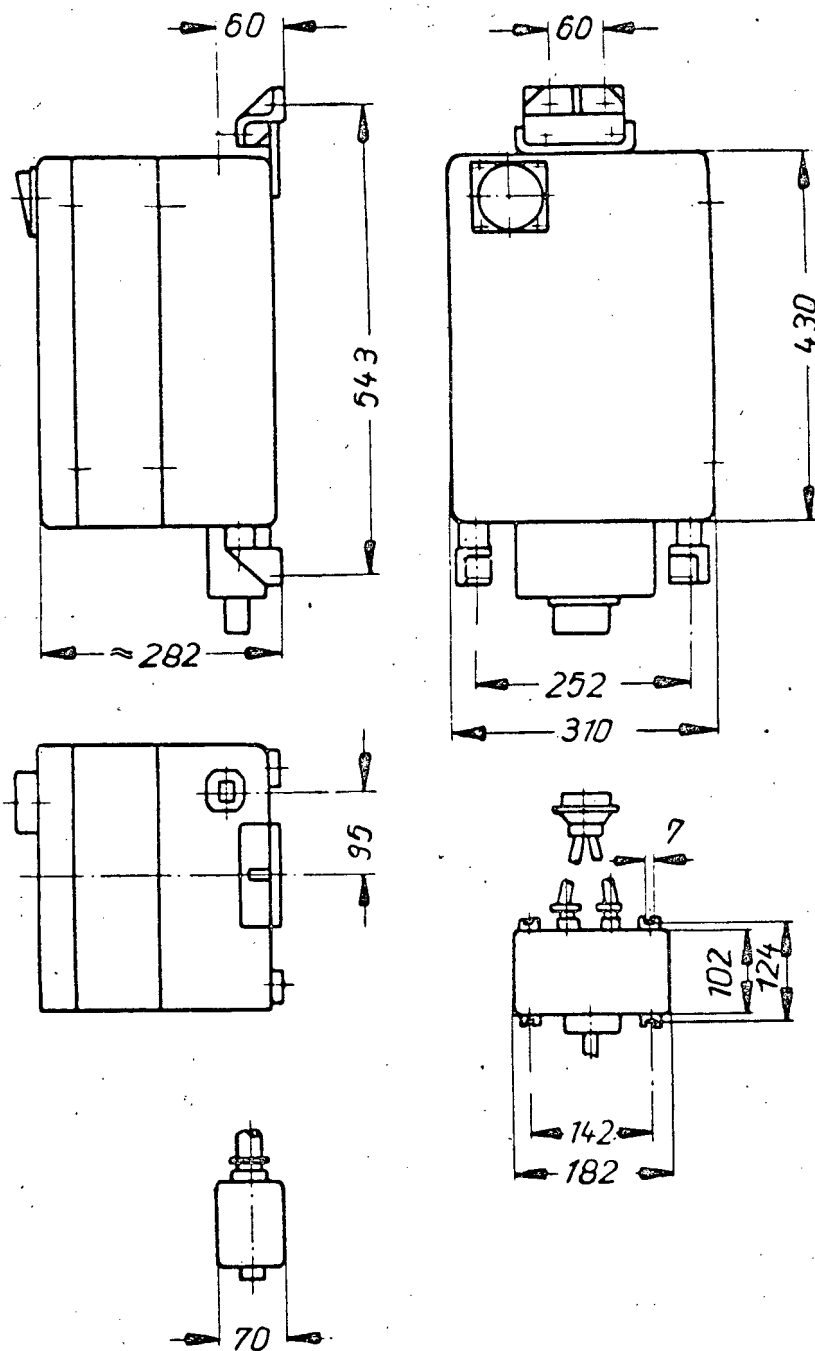


50X1-HUM

G 5 Transmitter and receiver diagram

Weight ^{about} ~~approx~~ 26 kilograms

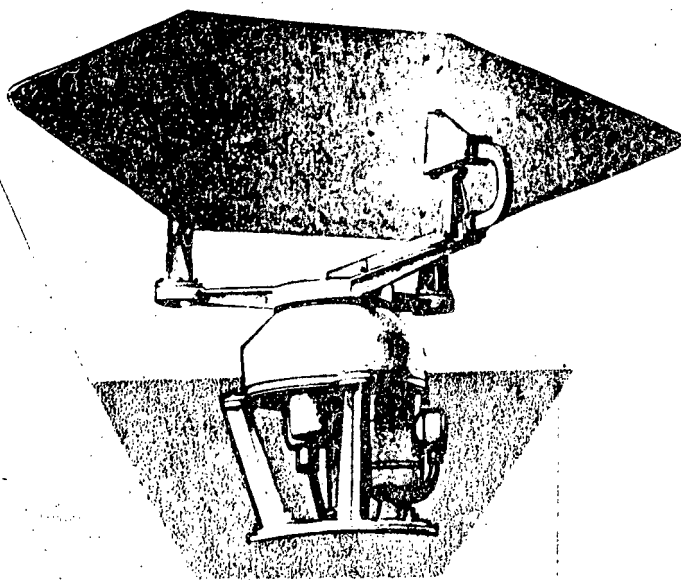
input
A-Eingang



A 5 Directional Beam Antenna Construction.

The antenna is composed of a parabolic reflector, antenna support column, gear box and drive motor. The antenna is constructed in the shape of a cylinder-parabolic reflector, ^{with} and a horn emitter ~~is located~~ in the center. The horn emitter opening is covered with a polystyrol plate, which prevents entry of moisture and foreign objects. During transmission the horn emitter emits pulses coming from the transmitter against the reflector, ^{from which} ~~wherefrom~~ they are transmitted as a focused beam.

During reception, the echo signals picked up by the reflector are fed to the horn emitter and transmitted to the receiver. For a good all-around view, the rotational antenna must be installed ~~in such way~~ ^{so} that the emitted ~~high frequency~~ ^{high frequency} energy is not influenced by interfering obstacles or reflectors.



Directional beam antenna with gear box

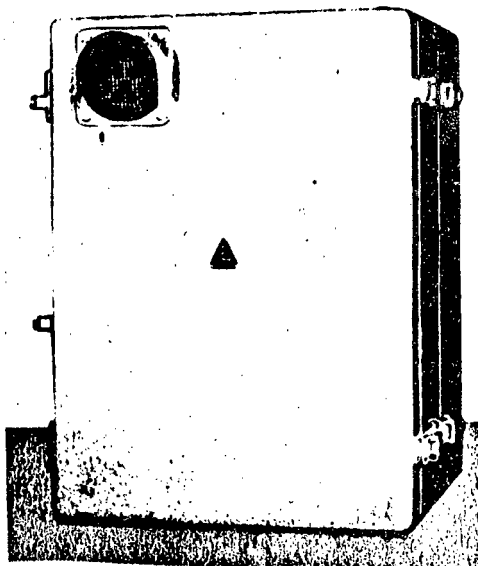
A rectangular tubular conductor is ~~utilized for transmission of~~ ^{used to} energy between the transmitter and receiver and the antenna. Energy ~~feed~~ between the rotary antenna and stationary power cable ^{is fed through} takes place via a swivel link located in the gear box.

The gear box also houses the rotation indicator for transmission of ^{the} number.

of turns to the rotation indicator receiver in the viewer and two cam switches. The drive motor is mounted from the outside to the gear box.

The rotation indicator ~~effects the synchronization~~^{es} of the antenna and deflection coil in the viewer. A cam switch synchronizes this operation. The second cam switch ~~effects the marking~~^{marks} of the forward direction on the screen of the viewer. It closes when the directional beam is ~~located~~ parallel to the longitudinal axis of the ship. ^{An ± 5 degrees} adjustment of ^{of the} forward contact is possible from the outside. Electrical connection between ^{the} antenna and ^{the} viewer is made by a cable consisting of 11 wire leads. The drive motor is turned on and off by the main switch ~~located~~^{at} on the viewer. It rotates the reflector support ^{at} 20 rpm and ^{the} rotation indicator ^{at} 360 rpm.

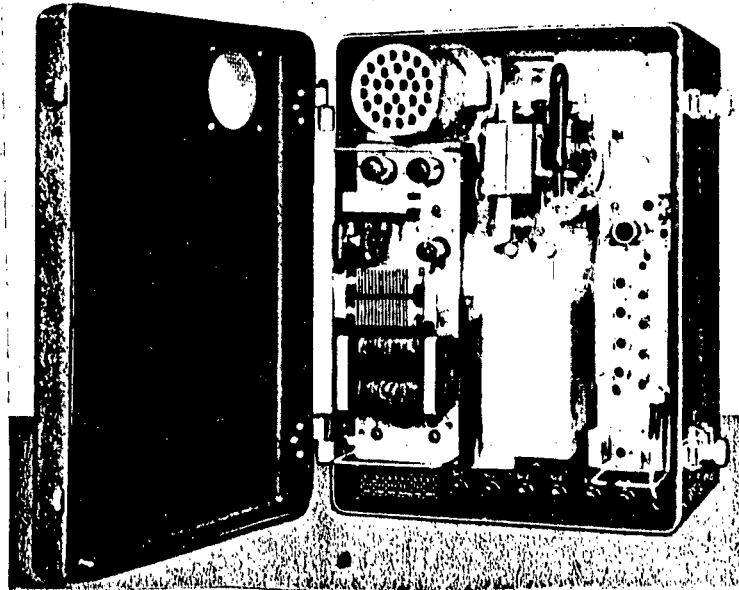
Transmitter and Receiver with Power Pack.



The transmitter and receiver ^{are} ~~is~~ built in book shape. Upon opening the front cover, the receiver, which is mounted to the mid-section and its power supply become visible.

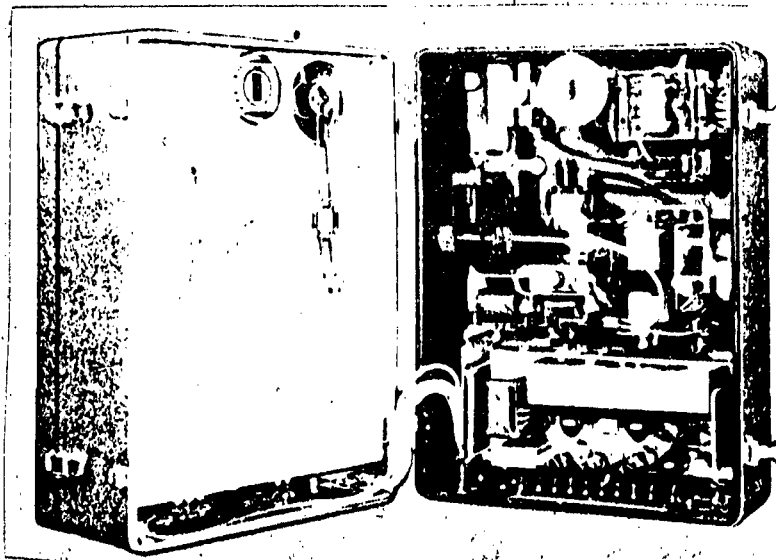
50X1-HUM

If the mid-section is tilted forward, the transmitter ~~which is~~ mounted ⁱⁿ the back becomes visible. All parts ^{up} front which come in ^{to} contact with energy (highest voltage ^{to} +300 v) are covered for protection.



Transmitter &
Receiver (mid-
section)

The unit continues operation upon opening of ^{the} cover, ^{but,} however, if the mid-section is tilted forward, a safety contact interrupts the power supply for the entire unit and the existent high voltage is short circuited. Fuses ~~located~~ in the mid-section belong to the transmitter as well as to the receiver.



Transmitter &
Receiver (rear
backall part)

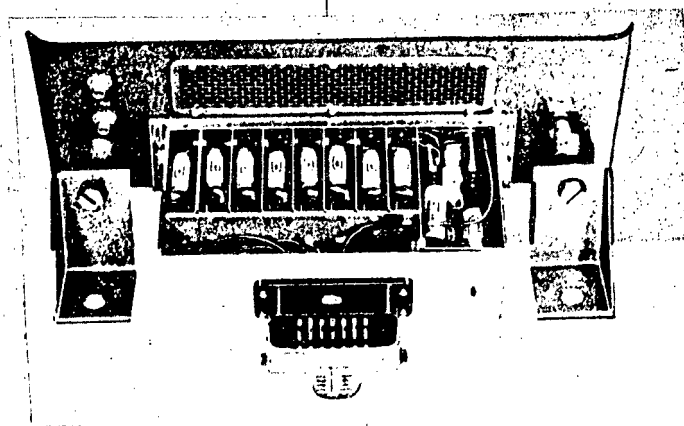
The majority of cables leading from the rear stationary part to the tiltable mid-section go ^{through} ~~via~~ the spring contact strips and terminal strips. Only the concentric intermediate-frequency cable goes directly from the intermediate-frequency amplifier output to the socket on the outside wall of the unit. Individual parts like ^{the} ~~an~~ intermediate-frequency amplifier, ^{the} ~~a~~ amplification power supply, ~~the~~ high-voltage power supply and the pulse generator can be easily pulled out by handles after loosening ^{the} ~~a~~ red marked screws on the chassis.

The klystron with some of its structural components is mounted on a cast chassis on the receiver side. On the transmission side, the keying circuit with its large structural components, i.e., modulation tube with heating-current transformer, high-voltage couple condensers and ^{the} ~~a~~ back charge resistor are also built directly onto the basic chassis.

A ventilation motor with propeller provides for sufficient ventilation of ^{the} transmitter. A relay prevents an immediate turning on of the unit to full power while still cold. After ^{about three} ~~approx. 3~~ minutes, the unit is automatically put into full operation.

All cables entering or leaving the transmitter and receiver are shielded for radio interference.

Transmitter & Receiver with radio interference eliminator



The Viewer.

The viewer is constructed as ^a slide-in unit which can be easily pulled ^{out} from a sheet-metal case after releasing the quick-opening latches on the side. This slide-in unit consists of a base and front plate on which various structural components are mounted:

electronic tubes

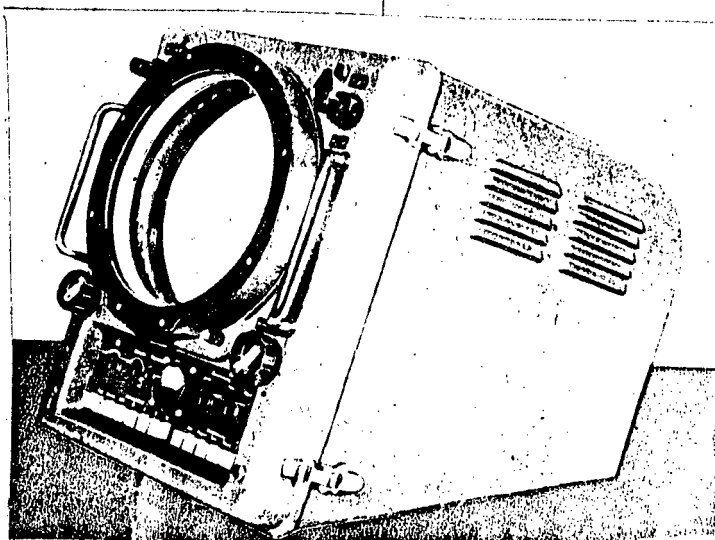
low-voltage power supply

high-voltage power supply

picture tube mounting

deflection unit

The electronic tube part can be dislodged sideways after removing (2) screws. ^{The} Cable connections to the base plate chassis remain connected, ^{since} as more components, i.e., push-button switch, control potentiometer, deflector coil, etc. belong to the tube part. This ^{set-up} ~~solution~~ guarantees continuous operation of the part even in a dislodged condition (individual parts are accessible during trouble-shooting).

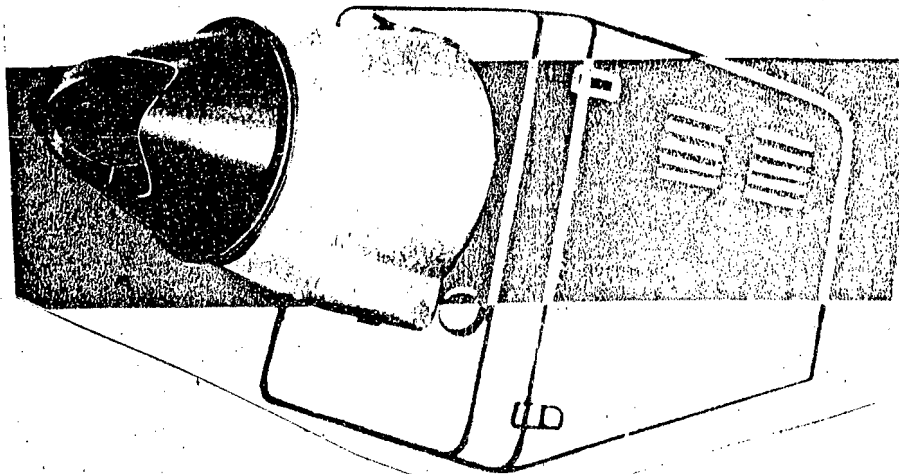


^{with}
Viewer ~~is~~ plotting device

50X1-HUM

The plotting device can be mounted on the face of the front plate. The glass plate with the writing surface can be illuminated. Lamps installed in the fastening ring can be turned on by a switch located in the lower part of the unit. Current for the lamps is supplied by two contacts, which automatically restore connection with the rest of the unit when set-up.

An observation tube can be mounted on the front plate in similar manner instead of a plotting device. A quick-opening latch mounted on the top holds the tube in position, and a rubber piece extends towards the observer.



with
Viewer ~~with~~ observation tube

The front plate of the viewer incorporates all the necessary elements for the operation of the set and evaluation of the screen image, i. e.:

- center point correction,
- basic brightness,
- contrast,
- range-finder with counter,
- dial illumination,
- expansion,
- reflector voltage,

indicator brightness

crystal current indication

modulation voltage indication

turning on and off of set, initial setting and selection of ranges (press buttons)

sharpening of minimum (rain, seaway), echo box turn-on, and zero point expansion (press buttons)

Operational possibilities

The FGS-350 ~~type~~ ship radar installation can be used either on ships or on land. The following operational performances are guaranteed:

1. Power cable (tubular conductor) can be 10 ^{meters} ~~m~~ long from transceiver to ^{the} antenna.
2. Coaxial cables from ^{the} viewer to ^{the} transceiver can be up to 100 ^{meters} ~~m~~ long.
3. The FGS 350 ~~type~~ ship radar installation with, the exception of the antenna, is dripproof and provided for assembly in closed rooms.
4. Complete function of ^{the} antenna is assured during all types of humidity and rain.
5. The FGS 350 ~~type~~ ship radar installation, with ^{the} exception of ^{the} antenna, is operational at ambient temperatures of 0 ^{degrees} ~~to~~ to + 55 ^{degrees} ~~centigrade~~ ^{centigrade}.
6. ^{The} Antenna performs satisfactory at ambient temperatures of - 30 ^{degrees} ~~to~~ to + 70 ^{degrees} ~~centigrade~~ ^{centigrade}.
7. ^{The} Antenna remains operational at a rolling angle of ± 50 ^{degrees}.
8. A switch on the viewer's junction box sets the antenna in motion when a freeze-up threatens, without setting the entire installation into operation.

Ordering Instructions

Domestic customers order the FGS 350 ~~type~~ radar installation from (VEB) ^{The Rostock Telecommunications} ^{Installation} ^{Construction} ^{Structure} Fernmeldeanlagenbau Rostock (FAB). Upon receipt of order the FAB Rostock will deliver.

50X1-HUM

a directional beam antenna	according to diagram 1551.012-00002
a transmitter and receiver	" " 1446.003-00001
a junction box for the transceiver	" " 6582.030-00001
a viewer	" " 1421.004-00001
a junction box for the viewer	6582.029-00001
UGMZ 5/400- type power supply (frequency transformer, operational control and adjustments form one structural element)	
Attachments	according to list 1420.005-00001 2L
Spare parts	" " 1420.005-00001 EL 1
(or according to special agreement)	
a description	1420.005-00001 B
four acceptance records	1420.005-00001 Apr

The power cable which connects the transceiver and the antenna consists of a rectangular tubular conductor with attached flange connections and angle elbows, all of which must be adapted to local conditions.

Power Supply must be Ordered Separately,

Order must be accompanied by an exact dimension sketch showing the routing of the power cable. ~~The~~ sketch must indicate what pipe length and angles are required in order that ~~they~~ be prepared in the work shop for assembly.

In addition, the exact position of the transceiver to the ship's longitudinal axis must be stated.

An echo box may also be incorporated into power supply, which, in the absence of natural targets, can reproduce an auxiliary target on the radar screen. The echo box must be ordered separately specifying model designation 1428.7 F 1.

A supporting column for the viewer will be delivered only upon special request.

Foreign costumers submit their order to the DIA ^{Electronics (German Domestic Foreign Trade)} (Deutscher Innen- und Aussenhandel

Elektrotechnik), Berlin N 4, Chausseestrasse 111 - 112. This agency will execute the pertinent delivery contracts with the manufacturer.

50X1-HUM

It is up to the customer to decide whether he wishes to assemble the installation or whether the assembly be performed by the Funkwerk Koepenick. In case customer decides to do the assembly, power supply delivery must be specially contracted.

We reserve the right to make any changes in the light of further technical developments.

In order to get further interesting information, especially information on proper utilization of set and its manifold application, we recommend that you contact VEB Funkwerk Koepenick. You will receive individual consultation by experts.

Our production program:

Electronic measuring instruments of high precision for all -around purposes of sinus, pulse and centimeter measuring technology

Transmission installations

for radio, UHF, television and commercial purposes

Ship radio and navigational equipment

ship transmitters, emergency transmitters, goniometers, distress call and alarm equipment, ship radar equipment

Gyrocompass installations

Hydro-acoustic installations

sonic altimeter, echograph, horizontal and vertical sounding installation

Ship guidance equipment

automatic telegraph installation and installations for intership voice communication, checking equipment with indicators at control station,

Speed checking equipment

Please write for printed materials. Export information by

DIA Deutscher Innen- und Aussenhandel "Elektrotechnik", Berlin N 4, Chausseestrasse

111-112 - Cable address: Diaelektro-Berlin

50X1-HUM

